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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/025,556	12/26/2001	Jeong Si Kim	P67461US0	8327

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JACOBSON, PRICE, HOLMAN & STERN
PROFESSIONAL LIMITED LIABILITY COMPANY
400 Seventh Street, N.W.
Washington, DC 20004

EXAMINER
KANG, INSUN

ART UNIT	PAPER NUMBER
2124	

DATE MAILED: 03/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/025,556	KIM ET AL.
	Examiner	**Art Unit**	
	Insun Kang	2124	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>26 December 2001</u>.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
   closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-10</u> is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1-10</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>26 December 2001</u> is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a) ☐ All   b) ☒ Some * c) ☐ None of:

   1. ☒ Certified copies of the priority documents have been received.

   2. ☐ Certified copies of the priority documents have been received in Application No. _____.

   3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
      application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date <u>12/26/2001</u>.

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____ .

DETAILED ACTION

1. This action is responding to application paper dated 12/26/2001.

2. Claims 1-10 are pending in the application.

Drawings

3.   Figure 1 should be designated by a legend such as --Prior Art-- because only

that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in

compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid

abandonment of the application. The replacement sheet(s) should be labeled

"Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct

any portion of the drawing figures. If the changes are not accepted by the examiner, the

applicant will be notified and informed of any required corrective action in the next Office

action. The objection to the drawings will not be held in abeyance.

4.   The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5)

because they include the following reference character(s) not mentioned in the

description: S225 in Fig. 4, S231 and S233 in Fig. 6. Corrected drawing sheets in

compliance with 37 CFR 1.121(d), or amendment to the specification to add the

reference character(s) in the description in compliance with 37 CFR 1.121(b) are

required in reply to the Office action to avoid abandonment of the application. Any

amended replacement drawing sheet should include all of the figures appearing on the

immediate prior version of the sheet, even if only one figure is being amended. Each

drawing sheet submitted after the filing date of an application must be labeled in the top

margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If

the changes are not accepted by the examiner, the applicant will be notified and

informed of any required corrective action in the next Office action. The objection to the

drawings will not be held in abeyance.

Specification

5.   Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent
and should include that which is new in the art to which the invention pertains. If the
patent is of a basic nature, the entire technical disclosure may be new in the art, and the
abstract should be directed to the entire disclosure. If the patent is in the nature of an
improvement in an old apparatus, process, product, or composition, the abstract should
include the technical disclosure of the improvement. In certain patents, particularly
those for compounds and compositions, wherein the process for making and/or the use
thereof are not obvious, the abstract should set forth a process for making and/or use
thereof. If the new technical disclosure involves modifications or alternatives, the
abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of
the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:
(1) if a machine or apparatus, its organization and operation;
(2) if an article, its method of making;
(3) if a chemical compound, its identity and use;
(4) if a mixture, its ingredients;
(5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

The abstract of the disclosure is objected to because the abstract compares the

invention with the prior art and refers to purported merits and speculative applications of

the invention. Correction is required. See MPEP § 608.01(b).

Claim Objections

6.   Claim 6 is objected to because of the following informalities: there appears to be

an additional blank in line 11. The blank needs to be deleted. Appropriate correction is

required.

Claim Rejections - 35 USC § 112

7.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

8.   Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

Per claim 1, it is unclear what the full race covering loop is. The claim merely

recites transforming the parallel loop into a full race covering loop without describing

what that means. It is interpreted as any loop for race detection.

Claim 1 recites the limitation "the parallel loop" in line 8 and "the parallel

program". There is insufficient antecedent basis for these limitations in the claim. They

are interpreted as "the original parallel loop" and "the parallel loop programs."

Per claim 1, it is unclear as to which race detection function it is referring in line 13. It is

interpreted as "the race detection function." In line 15, it is unclear as to what race

detection it is referring. It is interpreted as "the race detection function."

Claim 3 recites the limitation "the inputted statement" in line. There is insufficient

antecedent basis for these limitations in the claim. It is interpreted as "the inputted new statement."

Claim 3 recites the limitation "the parallel loop" in line 3 . There is insufficient antecedent basis for this limitation in the claim. It is interpreted as "the original parallel loop."

Per claim 4, it is unclear as to which parallel loop and full race covering loop they are referring in line 22. They are interpreted as "the parallel loop" and "the full race covering loop."

Claim 10 recites the limitation "the parallel loop" in line 25. There is insufficient antecedent basis for these limitations in the claim.

Claim 10 recites the limitation "said execution paths" in line 4. There is insufficient antecedent basis for these limitations in the claim.

Claim 10 recites the limitation "the parallel program" in line 8. There is insufficient antecedent basis for these limitations in the claim.

As per claims 2 and 5-9, these claims are rejected for dependency on the above rejected parent claim 1.

Claim Rejections - 35 USC § 101

9.   35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10.   Claims 1-9 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1-9 are non-statutory because they are directed to a "parallel loop transformation method" merely reciting a "method for race detection" including the steps of generating, transforming, instrumenting, and executing race detection. The claims do not recite a description of what race detection actually was or how the steps such as generating etc were conducted with respect to race detection. Causing an action or an intended action is different from actually performing an action. Generating, transforming, etc "for" race detection does not necessarily mean that the race detection step is actually performed. Therefore, the method for race detection is only an intended action. Thus the claims represent non-functional descriptive material that is not capable of producing a useful result, and hence represent only abstract ideas. Therefore, the claims are non-statutory.

Claim Rejections - 35 USC § 102

11.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12.   Claims 1-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim et al. ("Scalable On-the-fly Detection of the First Races in Parallel Programs," ACM, 1998) hereinafter referred to as "Kim."

Per claim 1:

Kim discloses:

-generating the data structure of a condition statement branch determinant string Cstr

required for loop transformation taking the parallel loop as an input and extracting the

execution path information ("a parallel program which has a parallel loop, page 346, 2.1

The First Races; "The monitoring process reports races which occur during the

monitored execution. This approach can be a complement to static analysis..., because

on-the-fly detection,...can be used to identify feasible (real) races from the potential

races reported by static analysis approaches," page 345 left col. First paragraph)

-transforming the parallel loop into a full race covering loop using said data structure of

a condition statement branch determinant string Cstr required for loop transformation

and said execution paths information ("a new scalable on-the-fly technique which

reduces the central bottlenecks to serializing at most two accesses of each thread to a

shared variable for detecting the first races in parallel programs which does not have

nested parallelism and inter-thread synchronization," page 345 left col. fourth

paragraph)

-instrumenting the race detection function in order to activate race detection function for

the transformed parallel loop which are generated at said step (b); and (d) executing

race detection while running the parallel program according to instrumented detection

functions which are determined at said step (c) ("a new scalable on-the-fly technique

which reduces the central bottlenecks to serializing at most two accesses of each

thread to a shared variable for detecting the first races in parallel programs," page 345

right col. Abstract) as claimed.

Per claim 2:

The rejection of claim 1 is incorporated, and further, Kim teaches:

- sequentially receiving each statement of each parallel loop body in order to generate a

single Cstr data structure for each single parallel loop; assigning a bit variable which

can store a true or false value to corresponding if-statement if said input statement is an

if-statement; and (a-3) extracting the Cstr data structure and the number of execution

path for each parallel loop through an arbitrary path analyzer after assigning said bit

variable (page 347, section 3. Detecting the First Races) as claimed.

Per claim 3:

The rejection of claim 1 is incorporated, and further, Kim teaches:

- determining whether the input statement is the first statement or not after a new

statement is inputted to the loop body (Figure 3-4: Checking a read/write candidate);

inserting an execution path control statement, prior to the input statement if the inputted

statement is determined to be the first statement, which dynamically assigns an

appropriate value for Cstr in order to allow each iteration to have an intended execution

path so as to minimize the duplicate monitoring for race detection against the parallel

loop (page 348 left col. Definition 3.1); substituting the conditional equation C1 of a

conditional statement by a conditional statement for $(Cstr[c\_con\_bit].eq.1) \wedge ((C1) \vee$

(C1)) if the present statement is determined to be a conditional statement after the

execution path control statement is inserted (page 348 Definition 3.2) ; and (b-4)

repeating the above actions until the inputted statement is determined to be the last

statement where, if the present statement is not an if-statement, the input statement is

maintained as it is and the above processes are repeated until a parallel loop is

transformed into full race covering loop (page 348 definition 3.2) as claimed.

Per claim 4

The rejection of claim 3 is incorporated, and further, Kim teaches:

-said present statement is not an if-statement, the input statement is maintained as it is

and the above processes are repeated until a parallel loop is transformed into fill race

covering loop (page 348 definition 3.2) as claimed.

Per claim 5

The rejection of claim 3 is incorporated, and further, Kim teaches:

-said execution path control statement can be listed as; p=(I/stride) mod k; if(p .eq. 0)

Cstr=(0)2 Else if (p .eq. 1) Cstr=(1)2; Else if (p .eq. K-1) Cstr=(K-1)2; Endif , where I is

loop control variable and k is the number of paths (page 348, Figure 3-4) as claimed.

Per claim 6:

The rejection of claim 3 is incorporated, and further, Kim teaches:

said execution path control statement determines the value of Cstr which is to be used

for determining the execution path of the loop body from the present iteration using the

value of the present loop control variable of each iteration (page 348 Definition 3.2) as

claimed.

Per claim 7:

The rejection of claim 3 is incorporated, and further, Kim teaches:

-said substituted conditional statement determines the branching of the present

conditional statement using the Cstr value corresponding to the present conditional

equation while maintaining the semantic of the original conditional equation (page 347,

section 3. Detecting the Frist Races, first paragraph) as claimed.

Per claim 8:

The rejection of claim 1 is incorporated, and further, Kim teaches:

- determining whether the statement inputted to instrument an appropriate race

detection function for the transformed parallel loop is the beginning and ending

statement of the parallel loop(Figure 3-4: Checking a read/write candidate);

instrumenting a label creation statement and a end statement which function on the

iteration less than two times of the front and end execution paths until the last statement

is inputted if the inputted statement is determined to be either the beginning and ending

statement of the parallel loop("a new scalable on-the-fly technique which reduces the

central bottlenecks to serializing at most two accesses of each thread to a shared

variable for detecting the first races in parallel programs," page 345 right col. Abstract);

instrumenting the inspection statement, which inspects whether or not the accessing

incident participates in the race, functions on the iteration less than two times of the

execution paths until the last statement if the present statement includes an accessing

incident of the shared variables ("our new technique which reduces the central

bottlenecks to serializing at most two accesses of each thread to a shared variable for

detecting the candidate races," page 348, left col. Last two paragraphs) as claimed.

Per claim 9:

The rejection of claim 8 is incorporated, and further, Kim teaches:

- inspecting the shared variables of said present statement to see whether any accessing incident is included if said input statement is neither the beginning nor the ending of a parallel loop (page 348 left column, "compare the current candidate in a thread with every previous candidate of the other threads to check if the two accesses are involved in a race...we use a shared access history for each shared variable, which is maintained to contain all the candidates monitored," page 348, left col. First section; Definition 3.1); and (c-6) instrumenting the statement which inspects the inclusion of these accessing incidents to function on the iteration less than two times of the execution paths if the shared variables of the present statement include accessing incidents (page 348 left column, "compare the current candidate in a thread with every previous candidate of the other threads to check if the two accesses are involved in a race...we use a shared access history for each shared variable, which is maintained to contain all the candidates monitored," page 348, left col. First section; Definition 3.1);

Per claim 10, it is the recording method version of claim 1, respectively, and is rejected for the same reasons set forth in connection with the rejection of claim 1 above.

13.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Insun Kang whose telephone number is 571-272-3724. The examiner can normally be reached on M-F 9:30-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Kakali Chaki can be reached on 571-272-3719. The fax phone number for

the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

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Business Center (EBC) at 866-217-9197 (toll-free).

I. Kang
3/2/2005

KAKALI CHAKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100